

ENCLOSURE 8

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8
9 IN THE UNITED STATES DISTRICT COURT
10 FOR THE WESTERN DISTRICT OF WASHINGTON

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UNITED STATES ATTORNEY
Seattle, Washington

11 DIOXIN/ORGANOCHLORINE CENTER, and)
12 COLUMBIA RIVER UNITED,)

13 Plaintiffs,)

14 v.)

15 DANA A. RASMUSSEN, et al.,)

16 Defendants.)

No. C91-1442-C

DECLARATION OF
IAN CHRISTOPHER
THOMAS NISBET

17 I, IAN CHRISTOPHER THOMAS NISBET, declare as follows:

18 1. My name is Ian Christopher Thomas Nisbet. I am
19 currently employed as President of I.C.T. Nisbet & Company, a
20 scientific consulting firm. My business address is 72 Codman
21 Road, Lincoln, Massachusetts 01773.

22 2. I hold a Ph.D. degree from the University of
23 Cambridge. I am a professional environmental scientist. A copy
24 of my Curriculum vitae is attached hereto as Exhibit A and is
25 incorporated herein by reference.

26 3. Since 1969, my principal professional work has
27 involved assessment of the distribution and effects of toxic
chemicals in the environment. I have specialized in assessment

1 of chlorinated hydrocarbons, including the chemicals known as
2 polychlorinated dibenzo-p-dioxins ("PCDDs" or "dioxins"). I have
3 conducted numerous risk assessments for these compounds,
4 including assessments of their likely effects on both human
5 health and the environment, including wildlife. Among other
6 things, I have conducted health and environmental risk
7 assessments for seven dioxin-contaminated sites on behalf of the
8 U.S. Environmental Protection Agency (USEPA). I am currently a
9 consultant to the U.S. National Research Council on risk
10 assessment methodology, including methodology for ecological risk
11 assessment.

12 4. I have conducted field studies and other
13 assessments of the effects of chlorinated hydrocarbons on fish-
14 eating birds since 1969. I have published a number of scientific
15 papers on this subject, including two review articles [1, 2]. In
16 1988, I presented an analysis of the effects of chlorinated
17 hydrocarbons on the Bald Eagle at an international conference and
18 my paper was published in the proceedings of that conference in
19 1989 [3]. In 1990, I served as a participant and as conference
20 summarizer at an expert consultation meeting on the Bald Eagle,
21 convened by the International Joint Commission [4].

22 5. I have reviewed a document entitled Total Maximum
23 Daily Loading (TMDL) to Limit Discharges of 2,3,7,8-TCDD (Dioxin)
24 to the Columbia River Basin (the "TMDL Document") and Responses
25 to Comments Received Concerning the Proposed Dioxin TMDL for the
26 Columbia River Basin issued by USEPA on 25 February, 1991 [5]. I
27 have also reviewed other related documents, including USEPA's

1 Ambient Water Quality Criteria Document for 2,3,7,8-
2 tetrachlorodibenzo-p-dioxin (the "AWQC Document") [6], and
3 USEPA's 1990 Work Plan for Investigation of Toxins in the
4 Columbia River Basin (the "1990 Work Plan") [7]. I have also
5 reviewed scientific studies of the behavior of PCDDs and other
6 chlorinated hydrocarbons in the environment, and of the effects
7 of these chemicals on fish-eating birds, including the Bald Eagle
8 [1-4, 8-19].

9 6. In my professional opinion, the TMDL Document is
10 scientifically deficient and the TMDL promulgated therein would
11 be inadequate to protect the natural environment of the Columbia
12 River Basin and Bald Eagles living there. The principal bases
13 for this opinion are given in paragraphs 7-15 following.

14 7. The TMDL Document addresses only one of the many
15 toxic chemicals found in the Columbia River Basin. This chemical
16 -- 2,3,7,8-tetrachlorodibenzo-p-dioxin ("2,3,7,8-TCDD") -- is one
17 of the class of chemicals known as polychlorinated dibenzo-p-
18 dioxins ("PCDDs" or "dioxins"). PCDDs, along with other related
19 compounds (e.g., polychlorinated dibenzofurans or PCDFs and
20 polychlorinated biphenyls or PCBs), share the property known as
21 "bioconcentration" -- that is, they accumulate in the tissues of
22 aquatic organisms, including fish, to concentrations much higher
23 than those in the ambient water to which the organisms are
24 exposed. In a process known as "biomagnification," these
25 compounds are further concentrated into the tissues of animals
26 that consume the contaminated organisms, including fish-eating
27 birds such as Bald Eagles.

1 8. These compounds are known to produce a variety of
2 toxic effects in mammals and birds, including the induction of
3 aryl hydrocarbon hydroxylase (AHH), inhibition of weight gain,
4 skin lesions, edema, thymic atrophy, immune system disfunction,
5 reproductive impairment including developmental effects,
6 endocrine dysfunction and neurological impairment. Many of these
7 toxic effects of 2,3,7,8-TCDD and dioxin-like compounds have been
8 observed in populations of wild mammals or birds [10-13, 15-16].
9 Fish-eating birds accumulate these compounds in their body fat
10 when they consume contaminated prey. These compounds can then be
11 passed, along with fat, to the egg at the time of its formation.

12 9. In its TMDL Document, USEPA attempted to determine
13 the amount of 2,3,7,8-TCDD that could be discharged to the
14 Columbia River without violating state water quality standards
15 [5, Appendix A]. These state standards were themselves based on
16 USEPA's Ambient Water Quality Criterion (AWQC) for 2,3,7,8-TCDD
17 of 0.013 parts per quadrillion (ppq). USEPA derived this value
18 by considering possible cancer risks to human consumers of fish
19 from contaminated waters [6]. However, at the time when the AWQC
20 Document was prepared, there was insufficient information to
21 establish a water quality criterion for protection of aquatic
22 organisms [6]. In fact, the AWQC Document stated explicitly that
23 the criterion was not meant to protect all species [6], and the
24 AWQC Document did not consider fish-eating mammals or birds in
25 any way.

26 10. It is not scientifically justifiable merely to
27 assume that the AWQC of 0.013 ppq would protect wildlife, for at

1 least two reasons. For one, wildlife, especially fish-eating
2 mammals and birds, are much more highly exposed to water-borne
3 contaminants than are humans. For example, most or all of the
4 diets of fish-eating wildlife species consist of fish, whereas
5 fish comprise less than one percent of the diet of the average
6 person in the United States. Second, some wildlife species,
7 including the mink [10] and certain fish-eating birds [10-11],
8 are especially susceptible to the toxic effects of PCDDs; these
9 species may well be more susceptible than humans, even if they
10 were exposed to the same doses, which they are not. For these
11 reasons, there is no basis whatsoever for concluding that the
12 criterion of 0.013 ppq would necessarily be protective of
13 wildlife species, such as fish-eating Bald Eagles.

14 11. The AWQC Document [6] was issued in 1984 and much
15 of the information on which it was based has been superseded by
16 new scientific information. In particular, much more information
17 is now available on the bioconcentration and biomagnification of
18 2,3,7,8-TCDD in fish and wildlife species, and on its toxic
19 effects in fish, birds, and mammals. Based on this new
20 information, EPA could have estimated the potential for
21 reproductive and developmental damage to wildlife species, such
22 as Bald Eagles (see paragraph 15 below).

23 12. Another serious deficiency of the AWQC Document,
24 as the basis for present-day standard-setting, is its treatment
25 of bioconcentration of 2,3,7,8-TCDD in fish. Based on
26 information available in 1984, the AWQC Document adopted a value
27 of 5,000 as an estimate of the Bioconcentration Factor (BCF).

1 The BCF is the factor by which the concentration of a chemical in
2 water can be multiplied to estimate the average concentration in
3 fish. This average concentration is then used to calculate the
4 exposure of consumers of the fish, and hence to estimate risks to
5 these consumers. Although the AWQC Document adopted the value of
6 5,000 for the BCF, it acknowledged that much higher values (up to
7 900,000) had been predicted for the BCF in published scientific
8 studies, so that concentrations of 2,3,7,8-TCDD in fish might be
9 underestimated [6, p.B-10]. Work reported since 1984 has
10 confirmed that the value of 5,000 is much too small [17]. Hence,
11 the actual exposures and risks calculated in the AWQC Document
12 were much too small. In other words, the 1984 criterion was not
13 adequately protective of human consumers, let alone species which
14 consume large quantities of fish in their diets, such as Bald
15 Eagles.

16 13. Although the TMDL Document recognizes that fish in
17 the Columbia River system are already contaminated with 2,3,7,8-
18 TCDD to hazardous levels [5, p. 3-2], it fails to take account of
19 this existing contamination in calculating the daily loading that
20 it would permit in the future. Based on the discussion in
21 Appendix B of the TMDL Document, the existing contamination of
22 the fish must be derived from discharges of 2,3,7,8-TCDD into the
23 river in the past, which would have resulted in retention of some
24 of the discharged chemical in the sediments, followed by uptake
25 into the fish. Any continued discharge into the system in the
26 future will augment the existing contamination and may result in
27 an increase in the levels of 2,3,7,8-TCDD in the fish above the

1 present, already unacceptable, levels of contamination. The TMDL
2 Document fails to take into account this existing contamination
3 in calculating the daily loading (i.e., the TMDL) that it would
4 permit in the future, however. As pointed out in paragraph 15,
5 below, loadings of 2,3,7,8-TCDD in the Columbia River System are
6 already sufficiently high to impair the reproduction of Bald
7 Eagles. Additional loadings will augment the exposure of the
8 Bald Eagles and will further contribute to their reproductive
9 impairment.

10 14. The TMDL does not reflect current scientific
11 knowledge or even customary EPA procedures in regard to multi-
12 chemical contamination. The TMDL Document considers and
13 establishes discharge limitations for only one chemical --
14 2,3,7,8-TCDD. This chemical is only one of the family of
15 chemicals known as PCDDs, and it occurs in industrial discharges
16 (including pulp mill discharges) and in the environment in
17 conjunction with other PCDDs and with other related chemicals
18 [18]. It is well-established scientifically that many of these
19 chemicals exert their toxicity by the same receptor-mediated
20 mechanism and that the effects of the various individual
21 chemicals are approximately additive [11, 19-22]. Hence, complex
22 mixtures of PCDDs, PCDFs, and related chemicals that occur in the
23 environment are more toxic -- often much more toxic -- than would
24 be predicted from the concentration of 2,3,7,8-TCDD alone. USEPA
25 and others have long recognized this and accordingly have
26 developed procedures for calculating the toxic potential of
27 mixtures of dioxin-like compounds, using toxic equivalency

1 factors ("TEFs") [11, 19, 21]. However, USEPA has failed to
2 apply its own procedure, or any other procedure, to the Columbia
3 River Basin, considering only one chemical in the TMDL Document
4 [5]. This failure to consider the effects of chemicals other
5 than 2,3,7,8-TCDD means that USEPA has understated the risks to
6 Bald Eagles and their environment, and overstated the degree of
7 protection. Thus, any claim that USEPA's TMDL would protect Bald
8 Eagles or their environment is misleading and incorrect.

9 15. Although many fish and wildlife species are
10 exposed to PCDDs and related compounds in the Columbia River
11 Basin, the Bald Eagle is at particular risk of high exposure.
12 Columbia River Bald Eagles not only consume large quantities of
13 fish (approximately 71% of their diets) [9], but also consume
14 fish-eating birds which themselves concentrate PCDDs and related
15 compounds to levels higher than those in the fish [9, 23]. Bald
16 Eagles are thus subject to greater exposure to these chemicals
17 than are other species which eat only fish. Studies in the Great
18 Lakes have shown that Bald Eagles accumulate extremely high
19 levels of PCDDs and related compounds in their tissues [19, 23].
20 Bald Eagles along the Lower Columbia River already suffer from
21 impaired reproduction, associated with exposure to chlorinated
22 hydrocarbons [9]. Although the relative roles of 2,3,7,8-TCDD
23 and other compounds in reproductive impairment of the Columbia
24 River Eagles have not yet been studied [9], there is good reason
25 to conclude that these eagles are exposed to hazardous levels of
26 2,3,7,8-TCDD. Data from USEPA's National Bioaccumulation Study
27 indicate that fish from the Columbia River Basin generally

1 contain 2,3,7,8-TCDD at concentrations in the range of 1-8 parts
2 per trillion (ppt) [7, Table 2]. Studies in other fish-eating
3 bird species have indicated that biomagnification factors
4 (concentration in bird tissue divided by concentration in fish)
5 for 2,3,7,8-TCDD are about 37 for eggs [11] and 32 for whole
6 bodies [14]. Thus, the concentrations of 2,3,7,8-TCDD in the
7 bodies and eggs of fish-eating birds in the Columbia River Basin
8 would be expected to be in the range 30-300 ppt. These are well
9 into the ranges associated with toxic effects in other species
10 [12, 24], even without considering the likely greater exposure of
11 Bald Eagles resulting from their consumption of fish-eating birds
12 as well as fish. Thus, it is probable that 2,3,7,8-TCDD at
13 existing levels of contamination is already contributing to
14 reproductive impairment in Bald Eagles in the Columbia River
15 Basin. Because the toxic mechanisms by which 2,3,7,8-TCDD and
16 other dioxin-like chlorinated hydrocarbons act are similar or
17 identical, the effects of 2,3,7,8-TCDD would augment the effects
18 of these other chemicals. Continued release of 2,3,7,8-TCDD into
19 the system would further augment the exposure of the eagles, as
20 discussed in paragraph 13 above, and hence adverse effects, such
21 as reproductive impairment, would also be augmented.

22 16. Based on the foregoing considerations, it is my
23 professional opinion that the TMDL promulgated does not reflect
24 current scientific knowledge and would not protect Columbia River
25 Bald Eagles or their environment. Continued discharge of
26 2,3,7,8-TCDD (in conjunction with discharge of related compounds
27 and pre-existing contaminant levels) would probably cause adverse

1 effects on bald eagles and other aquatic wildlife.

2 I declare under penalty of perjury that the foregoing
3 is true and correct to the best of my knowledge. Executed this
4 11th day of November, 1991, in Lincoln, Massachusetts.

5 Ian C. Nisbet.
6 IAN CHRISTOPHER THOMAS NISBET

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EXHIBIT A

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CURRICULUM VITAE

IAN C. T. NISBET

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